

REMARKS

The foregoing amendment amends claims 2, 3 and 4 and adds claims 8-25 to more fully capture the instant invention. Pending in the application are claims 1-25, of which claims 1, 8, 15 and 22 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance.

Claims 2 and 3 are amended for purposes of clarity.

Claim 4 is amended to depend from claim 3.

New claims 8-25 have been added to more fully capture the instant invention. New independent claim 8 corresponds to some of the subject matter of claim 2 rewritten in independent form, which the Examiner indicated to be allowable. Dependent claims 9-13 depend from claim 8 and recite subject matter originally found in claims 2-7.

New independent claim 15 corresponds to the subject matter of original claim 1, and further specifies the sleeve has a body portion, the flange portion, a first groove disposed on a radially outer surface of the body portion receiving a first o-ring for contacting a radially inner surface of the rotatable seal ring and a second groove disposed in a radially inner surface of the flange portion receiving a second o-ring for contacting a radially outer surface of the rotatable seal ring. Support for the subject matter of claim 14 can be found throughout the application as originally filed, at least, for example, on page 6, lines 23-30. New claims 16-21 depend from claim 20 and recite additional patentable subject matter originally found throughout the application as filed.

New independent claim 22 recites subject matter originally found in claim 1 and further specifies that the axially extending passage allows passage of a barrier fluid therethrough for pressure balance control. New claims 23-25 depend from claim 20 and recite additional patentable subject matter originally found throughout the application as filed. *No new matter is added.*

Claim Rejections Under 35 USC § 112

Regarding the objection to claim 4 for lacking antecedent basis for the recitations of a “first piston area” and “fourth piston area” in lines 1-3, Applicants have amended claim 4 to depend from claim 3, which provides antecedent basis for the recitations.

Claim Rejections Under 35 USC § 102

Applicants thank the Examiner for the close review of the claims and for indicating that claims 2-3 recite patentable subject matter. In the Office Action, claims 1 and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Rockwood, US No. 5,494,299 (“Rockwood”). Applicants traverse the rejection and submit that claims 1 and 4-7 distinguish patentably over the Rockwood reference. The Rockwood reference does not disclose a seal including a single rotatable seal ring having a pair of concentric seal faces, as recited in claim 1. Rather, the Rockwood reference requires two separate rotary seal members, each defining only one *single* face.

The Rockwood reference discloses a quad seal construction, including two separate stationary seal rings and two separate rotary seal rings, that is configured so that process fluid exerts pressure to bias sealing faces into engagement with each other. According to the Examiner, the component 256 in the Rockwood seal is a “single rotatable seal ring having a pair of concentric seal faces to form a radially inner seal face and a radially outer seal face.” Applicants respectfully disagree and submit that the component designated by reference number 256 is neither a *rotatable* seal ring, nor a seal ring with two radially spaced seal faces. In addition, the component 256 does not have an *axially extending passage* formed therein for allowing passage of a barrier fluid therethrough. Rather, the component 256 is a component of a *stationary* seal ring 214, as clearly set forth in column 11, line 57 through column 12, line 24. Moreover, the stationary member 214 including the portion 256 includes a single seal face formed by the nose portion 258. In contrast to the Examiner’s assertion regarding the axially extending passage, Applicants respectfully point out that the passage 282 in Rockwell extends between two separate seal components, and is not formed through a *single* seal component, as recited in claim 1.

In contrast to the claimed invention, rotary portion of the seal in Rockwood comprises two *separate* rotary seal rings 208, 210, each defining a *single* seal face, as clearly set forth in column 11, lines 36-56. In addition, the Rockwood reference does not teach or suggest that barrier fluid can be used for pressure balance control, as described in the present application. Therefore, the seal of Rockwood does not disclose the elements of claim 1, and the rejection of claims 1 and 4-7 should be reconsidered and withdrawn.

New Claims

As recognized by the Examiner, the Rockwood reference does not disclose the subject matter of claims 2 and 3. New independent claim 8 incorporates the patentable subject matter of claim 2 and specifies that the rotatable seal ring and the first and second stationary seal rings are configured and arranged to provide for first and second piston areas on a face wall of the rotatable seal ring adjacent an inner surface of the flange that allow the barrier fluid to exert pressure across a selected portion of the contact area of the seal face contact areas. Claim 8 further specifies that the selected portion is between about 50% and about 140% of the seal face contact areas. Dependent claim 9 recites the additional subject matter of claim 2, namely that the selected portion is about 140% of the contact area of the seal face contact areas. Therefore, claims 9-14 should be in immediate condition for allowance.

Claim 15 specifies that the sleeve and flange portion of the sleeve have grooves with O-rings for sealing against the portion of the rotary seal face inserted between the flange portion, which is clearly not taught or suggested in the cited references. For example, in an illustrative embodiment of the invention, the o-rings 34, 38 in grooves 32, 36, respectively, of the flange abut and seal against the axially rearward portion of the rotary seal ring 42, which is received within the flange portion. The Rockwood reference does not disclose a unitary seal ring including an axially rearward portion sealed against a flange in such a manner. Therefore, claim 15 and claims 16-21, which depend from claim 15, are in immediate condition for allowance.

In addition, the Rockwood reference does not teach or suggest a flange portion of a mechanical seal that is separated from a radially extending surface of a rotatable seal ring opposite the radially outer seal face to define a first piston area for allowing process fluid to

exert pressure on the radially outer seal face, as recited in claim 16. Rather, in the Rockwood reference, the sealing flange 200 abuts the rotary seal rings with no space therebetween.

The Rockwood reference also does not disclose a piston area formed on a radially extending surface of a rotary seal face that is about 70% of an area of the radially outer seal face, as recited in claim 17. In fact, no piston area is formed on a rear surface of a rotary seal face in Rockwood.

The Rockwood reference also does not disclose a rotatable seal ring including a radially outward portion defining a radially outer seal face, a radially outward portion comprising a first axially extending outer surface, and an axially extending stepped surface positioned axially and radially inward of the outer surface to define a first axially inwardly facing non-seal face wall formed on a side of the radially outward sealing portion opposite the radially outer seal face, as recited in claims 18-21. Rather, the rotary seal rings in Rockwood have a straight rectangular configuration and no step is formed thereon. The stationary seal rings 214, 212 also do not have such a configuration.

New independent claim 22 recites the subject matter of claim 1 and further specifies that the axially extending passage allows passage of a barrier fluid therethrough for pressure balance control, a feature not taught or suggested in the Rockwood reference.

In addition, dependent claim 25, which depends from claim 22 specifies that the barrier fluid fills a space between the flange portion of the sleeve and an axially inwardly facing wall of the first seal ring to provide pressure balance control. The Rockwood reference does not disclose that barrier fluid may fill a space axially adjacent to a seal ring. Therefore, claim 25 recites additional patentable subject matter not taught or suggested in the cited Rockwood reference.

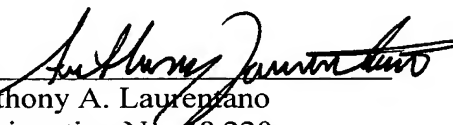
CONCLUSION

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this Amendment. However, if a fee is due, please charge our Deposit Account No. 12-0080, under Order No. CTH-302A from which the undersigned is authorized to draw.

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Respectfully submitted,

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